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THE TREATMENT AND PREVENTION OF PELLAGRA.

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Since the publication of the communication on the Cause and Prevention of Pellagra (Goldberger, Public Health Reports, Sept. 11, 1914), a large number of inquiries have been received asking for detailed directions as to the treatment and prevention of the disease. As it has been impracticable to reply to these as fully as appears desirable, it was decided to prepare and publish a brief summary of our conclusions as to the nature of pellagra, and with these as a basis to outline the treatment and means of prevention.

On taking up the study of pellagra one of the first and most insistent questions that confronted us was that of its communicability. Our studies, the general tenor of which was briefly indicated in the letter published September 11, 1914, and the details of which will be embodied in our completed reports, have led us to conclude (1) that pellagra is not a communicable (neither infectious nor contagious) disease, but that it is essentially of dietary origin; (2) that it is dependent on some yet undetermined fault in a diet in which the animal or leguminous protein component is disproportionately small and the nonleguminous vegetable component disproportionately large; and (3) that no pellagra develops in those who *consume* a mixed, well-balanced, and varied diet, such, for example, as that furnished by the Government to the enlisted men of the Army, Navy, and Marine Corps.[1]

Treatment.

Diet.—The experience of reliable observers has over and over again shown that we have no specific medicinal treatment for pellagra. At the same time, we find that even the earliest students of the disease make mention of the value of nutritious food. The early observers were led to feed their patients because they found that, as a general thing, the disease occurred then, as it does now, mainly in the poor and the badly nourished. It was not and is not a rare observation, however, to find individuals suffering from pellagra who, to all outward appearance, are perfectly well nourished. Such observations, naturally enough, gave rise to doubts and to skepticism as to any essential causative relation between undernourishment and pellagra. Indeed, such observations justify the inference that pellagra is not a disease of malnutrition, provided that by undernourishment or malnutrition we mean no more than is ordinarily understood, as some degree of starvation.

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[1] So far as can be ascertained, no man in our Army, Navy, or Marine Corps has developed pellagra who did not have it at the time of or before enlistment. Lavinder (Public Health Reports, Sept. 29, 1911, vol. 26) has reported a similar observation relative to the Italian army.

The comparatively recent studies that have definitely established beriberi as a "deficiency" disease, a disease of "undernourishment" or starvation in a sense hardly dreamed of before, have given a new and added significance to the more recent studies of nutrition and have opened a practically virgin field to the student of epidemiology and therapy.

If now we consider pellagra as a fault of nutrition ("undernourishment" or "starvation") in this new and special sense (that is, as in some way analogous to beriberi or scurvy), or, possibly, as suggested by the recent work of Meyer and Voegtlin [1] as a chronic intoxication with some poison taken in excess in a largely vegetable diet, we at once get a new and more sympathetic tolerance for the reports of beneficial results not only from the use of "nourishing" food alone, but also from those reports of unusually favorable results following the administration of this, that, or the other form of arsenic or other medicine. For on closer inquiry it will be found that in those instances where there seems to be reason for believing that the favorable results claimed for this or that drug appear to have a substantial basis in fact, the credit usually claimed for the medicine alone must, to say the least, be shared by the modification in the diet that is invariably found to have been ordered. Recurrences in such instances are not rare and not hard to understand, when one reflects that, having gotten well, the natural tendency is to go back to one's ordinary diet, and this usually the winter diet, to some of the characters of which we will again refer.

On the basis of the foregoing conclusions and in the light of the general considerations presented we would recommend that as long as clinical evidences of pellagra are manifest the patient should be given and urged to take (if necessary tube fed) an abundance of fresh milk, eggs, fresh lean meat, beans, and peas (fresh and dried, not canned).

We are not to be understood as saying that all cases will, or can, in this or in any other way, be saved. We fear that there will always be patients who even in their first attacks are, and will be, beyond hope of recovery.

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[1] Public Health Reports, June 19, 1914.

Milk.—Fresh milk alone, or in alternation with butter milk should be given freely. An adult should be urged to take not less than a pint and a half to two pints in 24 hours.

Eggs.—Fresh eggs should be allowed freely. In addition to the milk and meat, an adult should take not less than four eggs a day.[1] In certain of the severer forms it may be necessary to give the eggs in the form of albumin water.

Meat.—The meat should be fresh, lean meat. Whether all fresh meats are equally valuable in treatment we do not know; future studies will have to determine this. Our experience has been with beef alone. This may be served as scraped beef, as a roast, or as steak. Where mastication is painful, meat juice may be given instead. An adult should be urged to take at least a half pound of lean meat a day in addition to the milk, eggs, and legumes. It may be necessary in some instances to work up gradually to the point where these quantities can be taken.

Legumes.—We have been much impressed with the favorable results following the use of beans and peas alone. The beans and peas should be fresh or dried, not canned. A palatable pea or bean soup should be prepared and may be given freely. In addition to or in alternation with the soup, the beans or peas should be served and eaten in any one of the other well-known forms.

In cases presenting marked gastrointestinal symptoms, the diet of the patient may be limited to the foregoing articles. It may here be emphasized that diarrhea is no contraindication to the full feeding.

In cases presenting only moderate or no gastro-intestinal symptoms there may be added, in restricted amounts, oatmeal, rice, and barley as cereals, potatoes and onions as fresh vegetables, fresh or dried (not canned) fruits, and wheat or rye bread or biscuits.

As long as symptoms of pellagra are perceptible we prefer to exclude all corn products; not that corn is not a wholesome and nutritious food, but because the occurrence of pellagra is commonly, though by no means exclusively, associated with the consumption of a diet in which corn forms a disproportionately large part. Similarly, a reduction in the amount of other carbohydraceous articles, such as molasses, jams, or starch, should, we think, be ordered, if on analysis of the patients prepellagrinous dietary some such articles or combination of articles appear to have formed a very conspicuous portion of the diet.

After all symptoms of pellagra have disappeared corn and other starchy foods in moderation and suitably guarded with milk, meat, and legumes may unhesitatingly be allowed.

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[1] Dr. I. W. Cooper, a member of the Mississippi State Board of Health, under date of Sept. 19, writes us as follows: "For the past several years, the only treatment I have given my pellagra patients was a diet of milk and eggs, some taking 16 eggs and one-half gallon of sweet milk during the 24 hours, and in every case where these suggestions were carried out fully there was a marked improvement, and in a majority of cases a complete cure so far."

Medication.—As has already been sufficiently indicated, we have no medicine that has any specific value. Tonics may of course be used and may at times be helpful, but as a rule they are not needed. Special disturbing symptoms, particularly pain and insomnia, should be treated on general principles.

For the gastro-intestinal symptoms the best treatment is the diet.

Climate.—In the acute stage it is advantageous to protect the patient from the sun. A change of climate is valuable in proportion to the degree and character of the change of diet it involves. It is not essential, for the correction in the diet may equally well be made at home.

Prophylaxis.

The prevention and eradication of pellagra will depend essentially on the substitution of a mixed, well-balanced, varied diet for the restricted, one-sided diet that the individual will be found to have consumed prior to the development of symptoms.

In a very large proportion, possibly as much as one-half, of the noninstitutional cases in the United States very little change, if any, in the diet *available* to the individual is called for, the point of chief importance being to correct the dietary eccentricity of the affected individual. As a rule, however, in order to increase the "margin of safety," some modification is desirable; some reduction in the amount of the corn ("flakes," grits, meal, molasses, starch), or other starchy foods entering into the family diet may well be insisted on.

Perhaps the most important change in the diet that we would urge is that which relates to the animal and leguminous protein component. An increased consumption of fresh (lean) meat, of fresh milk, of eggs, or of the legumes (beans and peas, fresh or dried, but not canned) and, preferably of all of these, is considered essential to give proper balance to the diet. The cheapest and most readily available of these are the legumes, and the poor, especially the poor of our South, should be instructed and urged to include them in, or materially to increase the proportion in which they enter into, their daily diet, especially during the late fall, winter, and early spring months. There is reason for more than a suspicion that the introduction of, or the increase in, the legumes in the daily dietary coincident with the coming to our tables of the "fresh vegetables" of summer, is in part, at least, responsible for the improvement and recovery of the cases of pellagra that appear annually as a sort of spring crop following a winter diet in which these elements are more or less conspicuously small or altogether absent.

The evidence is daily becoming stronger that the eventual eradication of pellagra from our South will depend largely on the successful introduction of our common dried legumes into the winter dietary. A valuable step in this direction would be an increase in the cultivation of some of the varieties of beans and peas and their preservation in the dried state for winter consumption.

What has been said concerning noninstitutional cases applies to cases at orphanages, except that here one need concern oneself primarily but little with individual eccentricities of taste. At these institutions a modification of the dietary alone along the lines indicated will, we believe, be followed by the complete wiping out of the disease. In this connection we may say that we have knowledge of an institution where this has actually happened. The occurrence of 75 cases of pellagra at orphanage "B. H." in the spring of 1913, following apparently milder outbreaks in 1911 and in 1912, led to a modification, along the lines above mentioned, of the diet of the affected group of children, the outbreak having been strictly limited to the boys and girls belonging to one of three groups into which the inmates were divided. Not a single case is known to have developed this year (spring and summer, 1914) among a total of some 234 of the children of this orphanage. We have reason to believe that this is not a unique experience.

At asylums for the insane the problem, though essentially dietary, is complicated and greatly obscured or masked by the varying demeanor of the different mental types, resulting in more or less marked eccentricities of diet that are difficult if not well-nigh impossible to wholly prevent. This applies more particularly to those types of individuals (dements) whose mental condition leads to apathy and indifference, necessitating a special care which, in the overcrowded and undermanned institution, can not be given them.

At nearly if not quite all of these institutions the diet may be said to be adequate, though in some, at least, an increase in the animal and leguminous protein component appears highly desirable. On this point we expect to hear warm protest from asylum officials. We expect to be informed that we must surely be wrong, for at such and such institutions, where an ample allowance of fresh meat is made, there is nevertheless an excessive prevalence of pellagra. We do not know how much meat is "allowed;" indeed, we have no wish to doubt that an "ample allowance" is actually made. From personal observation, however, we know that some, at least, of the inmates do not get an "ample allowance;" the little that they do get on their plates they do not always eat, at times perhaps because of a delusional or other dislike for meat, or by reason of its having been stolen from their plates by another inmate (a "stealer") or, in those who must be specially fed, because the feeding is not properly done.

At asylums for the insane, not only should a mixed, well-balanced, varied diet be furnished, but measures must be taken to see that the individual patient actually eats it. To have a good, rich, mixed, well-balanced, and varied diet "on the family table" is one thing; to eat it is quite another; the former is perhaps greatly to be desired, but the latter alone, we believe, will prevent pellagra.